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Survey of the Loggerhead Shrike in the Southern Aspen Parkland Region, 2000-2001

Alberta Species at Risk Report No. 46

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

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Survey of the Loggerhead Shrike in the Southern Aspen Parkland Region, 2000-2001

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and

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EXECUTIVE SUMMARY

Populations of the loggerhead shrike (*Lanius ludovicianus*) have declined markedly in many areas of North America in recent years. In Alberta, the species is now absent from much of the Central Aspen Parkland, and is considered to be a species of "Special Concern" in the province. In the central areas of the province, populations are now so low and sparsely distributed that monitoring techniques used in other areas of the province (roadside inventories, block surveys and Breeding Bird Surveys) are not effective. In 2000 and 2001, we undertook an intensive search for loggerhead shrikes along the southern boundary of the Central Aspen Parkland to help define the status and breeding locations of the species in this area. Searches were conducted from roadsides, and involved visual inspection of areas of suitable habitat (shelterbelts, native woody areas, farmsteads). Call playbacks were used at many sites to facilitate locating birds.

In 2000, 1,404 km of roads were surveyed over 71 person-hours of effort. A total of 26 adult shrikes and three nests were found at 18 sites. In 2001, the search area was expanded, with 3,411 km of road over 147 person-hours of field time being covered. The 2001 effort included resurveying 754 km of route covered in 2000 (including all occupied sites). A total of 81 adult shrikes and 40 nests were found at 55 sites in 2001. Seven of 18 sites occupied in 2000 were unoccupied when revisited in 2001, but six new shrike observations were made at sites along the resurveyed route that were not occupied in 2000. Overall densities of shrikes were higher in 2001 (0.016 sites/km and 0.37 sites/person-hour) than in 2000 (0.013 occupied sites/km of road surveyed and 0.25 sites/person-hour of effort). However, densities were similar along the route surveyed in both years (0.024 occupied sites/km in 2000 and 0.023 sites/km in 2001). The more frequent use of call playbacks in 2001 may be partly responsible for the higher number of shrikes observed in that year.

Overall, we found shrikes at 61 unique locations over the two years of work. This total includes an incidental observation of a pair and five fledged young near Vermilion, which is well north of the study area. Shrikes were generally found in shrubby areas (often willows around dry sloughs) or treed areas adjacent to pastureland. The main concentrations of loggerhead shrikes occurred in the areas between Gough Lake and Coronation, and around Provost. These concentrations are along the southern edge of the Parkland boundary. However, incidental observations of birds outside of the study area suggest that loggerhead shrikes can occur at low densities throughout the Parkland. Continued efforts will be needed to monitor this small regional population (likely no more than 300-400 pairs).

1.0 INTRODUCTION

The loggerhead shrike (*Lanius ludovicianus*) is one of two species of shrikes that occur in North America. This species occupies open grasslands, intermingled with trees and shrubs for nesting and perching. Shrikes differ from other songbirds in that they regularly feed on small vertebrate prey and have evolved the unusual tactic of impaling their live prey on sharp objects (Cadman 1985). Several subspecies of the loggerhead shrike occur in North America. The subspecies occurring in Alberta acr- -s the Northern Great Plains is *L. l. excubitorides.*

Loggerhead shrike populations have declined throughout much of North America. This is especially true in eastern parts of the continent, where the species (*L. l. migrans*) has disappeared from many areas. Populations in eastern Canada are now designated as being "Endangered" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2001). Populations in western Canada have declined less dramatically, but are still considered to be "Threatened" (COSEWIC 2001). Breeding Bird Surveys indicate that continental populations have declined by 3.6%/year since 1966 (Sauer et al. 2001). Declines in Canada over the same period have been 9.7%/year (Sauer et al. 2001).

In Alberta, the loggerhead shrike was once a common inhabitant of the Aspen Parkland (including the Peace Parkland) prior to the 1950s (Farley 1932, Salt and Wilk 1958). Since that time the species has undergone a marked range contraction. The species no longer occurs in the Peace Parkland, and has disappeared from much of the Central Parkland. Breeding Bird Surveys show that the provincial population declined rapidly between 1966 and 1979 (12.6%/year; Sauer et al. 2001). Although populations in the province appear to have stabilized since 1980 (Prescott and Bjorge 1999, Sauer et al. 2001), the current population estimate of around 3000 breeding pairs (Bjorge and Prescott 1996, Prescott and Bjorge 1999) is likely low compared to historical norms. The species is now included on Alberta's list of "Sensitive" species that may require specific management attention to prevent them from becoming at risk in the province (Anonymous 2001). The species was further assigned a status of "Special Concern" by the Minister of Sustainable Resource Development in 2000.

Population trends of loggerhead shrikes have been monitored by a variety of techniques in Alberta, including roadside inventories (Telfer 1989, Johns et al. in prep), intensive block surveys (Bjorge and Prescott 1996, Bjorge and Kiliaan 1997) and the Breeding Bird Survey (Sauer et al. 2001). These surveys show that the majority of loggerhead shrike breeding pairs in Alberta occur between Stettler and Gleichen and east to the Saskatchewan border (i.e., between 50°30' and 52°30'N, east of 113°W; Prescott and Bjorge 1999). The current inventory, which involved intensive searches for loggerhead shrikes in the Parkland Region, was undertaken to define the status and breeding locations in an area where populations are now too low to be effectively monitored by most generalized bird surveys.

2.0 STUDY AREA AND METHODS

In 2000, the survey was conducted in a 30 to 40-km wide band along the southern edge of the Central Parkland Natural Region, from Rumsey (51°50'N; 112°55'W) and Stettler (52°19'N; 112°44'W) to the Saskatchewan border near Provost (52°20'N; 110°10'W; Figure 1). This area is just beyond the northern edge of the block surveys conducted in 1993 by Bjorge and Prescott (1996). The majority of this region is agricultural land, interspersed with woody vegetation, wetlands and river valleys. In 2001, sites where shrikes were found the previous year were re-sampled, and the study area was expanded northward from the southernmost boundary of the Parkland Region north to Highway 53 (52°30'N), Highway 603 (52°29'N), and the southern edge of Canadian Forces Base Wainwright (52°35'N; Figure 1). Approximately 50% of all primary and secondary roads in the study area were sampled in each year.

A single observer (HK) driving and searching for probable shrike habitats conducted both surveys. Sites were surveyed between 27 June and 13 July 2000, and between 19 and 30 June 2001. These periods correspond to the time when adults are actively feeding young, and are most detectable. Surveys were conducted during daylight hours (0800 to 2000 h) and generally took place on sunny, warm (>20°C) days. Transects were driven at 40 to 70 km/hr and potential loggerhead shrike habitats (shelterbelts, native woody areas, farmsteads) were identified from the road. Likely areas of shrike habitat were examined more closely by slowing down or stopping the vehicle for a more careful examination. Potential areas were then examined for loggerhead shrikes with the use binoculars and a 60X spotting scope. Once a shrike was spotted, a search of the sighting location was often performed to locate the nest and young. Habitat types (pasture, farmland, wetland, and dominant vegetation) and number of adults were recorded and the locations of sightings were taken using a Garmin GPS 45XL. If the nest was found, notes were taken on clutch or brood size and approximate age of the young.

In order to increase detection rates of shrikes, we experimented with the use of call playbacks in suitable habitat. Although we are not aware of any published accounts of playbacks being used to census loggerhead shrikes, the technique is well established for a wide variety of bird species (Ralph and Scott 1981). During the 2000 survey, a tape of loggerhead shrike alarm calls was recorded from site 11 (see Appendix 1) with a Sony TCM-5000™ Audio Tape Recorder. Calls were then played back at approximately one-third of sites visited. Playbacks were most often broadcast at sites visited during the hottest part of the day (1200 to 1400 h), when birds usually remain hidden in shady areas. In 2000, the tape was played for approximately three minutes, and loud enough to be heard throughout the immediate vicinity. For the 2001 survey, the calls were played at most areas considered to be potential shrike habitat, if an initial visual search did not detect any birds. Each playback was broadcast for a maximum of one minute, or until a shrike was observed. If birds were detected, a nest search was conducted for a maximum of 45 minutes. When re-surveying (in 2001) sites occupied in 2000, a site was considered occupied again if the new observation occurred within 500 m of the previous observation.

3.0 RESULTS

In 2000, 1,404 km of roads were surveyed during 71 person-hours of field effort. Approximately 175 survey stops were made, at roughly 50 of which call playbacks were used. In 2001, 754 km covered in 2000 were surveyed again (including all occupied sites), in addition to 2,657 km of new coverage, for a total survey distance of 3,411 km. The 2001 survey was conducted in 147 person-hours of survey time. Approximately 250 survey stops were made in 2001. Call playbacks were used at roughly 220 of the survey stops.

The 2000 survey located 26 adult shrikes at 18 sites, including eight pairs, 10 single birds, and three confirmed nests (Table 1, Appendix 1). Two of the single shrikes observed had fledged young, indicating the presence of a breeding pair of adults. These surveys detected 0.013 occupied sites/km of road surveyed and 0.25 sites/person-hour of effort. A 19th site (denoted "99" in Appendix 1 and Figure 1) in the 2000 survey was an incidental observation of a pair with five fledged young from out of the study area near Vermilion (Figure 1). In 2001, 81 adult shrikes, including 28 pairs, 25 single birds, and 40 nests were found at 55 sites (0.016 sites/km and 0.37 sites/person-hour; Table 1, Appendix 2). Twelve of the single birds found had nests with eggs or young. No fledglings were found in 2001 due to the earlier timing of the survey.

Sites 1 to 18 were surveyed in both 2000 and 2001. Seven of 18 sites occupied in 2000 were unoccupied when revisited in 2001 (Appendix 2). However, six new shrike observations were made in 2001 along the 754 km of road surveyed in both years that were not at locations occupied in 2000. Shrike densities for routes surveyed in both years were 0.024 occupied sites/km in 2000 and 0.023 sites/km in 2001.

Table 1. Summary of loggerhead shrikes found in 2000 and 2001 in the Aspen Parkland Region.

	2000 (n=18 sites)	2001 (n=62 sites)
Distance Surveyed (km)	1404	3411
Survey Effort (person-hrs)	71	147
Pairs	8	28
Single Adults	10	25
Total Adults	26	81
Nests Found	3	40
Fledglings	11 (4)*	0
Nestlings	4 (1)	144 (30)
Unhatched Eggs	0	61 (10)
Density (sites/km)	0.013	0.016
Density (sites/person-hr)	0.25	0.37

*Numbers in parentheses indicate number of sites or nests.

Over the two years, a total of 61 unique sites were found to be occupied by loggerhead shrikes in the Aspen Parkland region (including the incidental observation near Vermilion). Loggerhead shrikes were generally found east of 112°30'W; only one observation (site 18, near Rumsey) occurred west of this line (Figure 1). In the western half of the study area, shrikes were not found north of the latitude of Stettler (approximately 52°20'N). In the eastern half of the area however, records extended to the northern margin of the area searched (approximately 52°35'N), although most records were concentrated further south (Figure 1). The main concentrations of loggerhead shrikes occurred in the areas between Gough Lake and Coronation, and around Provost.

In the 2000 survey, 61% (11 of 18) of shrikes found were located in or near pasture, 28% (5 of 18) were located in or near cultivated fields and 33% (6 of 18) occurred near prairie sloughs. Fifty-six percent (10 of 18) of shrikes were observed in willow (*Salix* spp.), 33% (6 of 18) were in trembling aspen (*Populus tremuloides*) and 11% (2 of 18) were in caragana (*Caragana aborescens*). In 2001, 79% percent (42 of 53) of shrikes were located in or near pasture, 32% (17 of 53) occurred near prairie sloughs, and 32% (17 of 53) were located near cultivated fields. Seventy-seven percent (41 of 53) of shrikes observed were in willow, 17% (9 of 53) were in aspen, 9% (5 of 53) were in caragana, and 6% (3 of 53) were in maple (*Acer* spp.).

4.0 DISCUSSION

The intent of this work was to clarify the status of the loggerhead shrike in the Central Aspen Parkland of Alberta. Birds in the Parkland were generally found in shrubby areas (often willows around dry sloughs) or treed areas adjacent to pastureland. This is consistent with documented habitat preferences in the province (Telfer 1992, Bjorge and Prescott 1996, Prescott and Bjorge 1999). Despite the relative prevalence of such habitat types throughout the Parkland, our results indicate that the species is now very limited in its distribution in the area. Two main concentrations of birds were found: between Gough Lake and Coronation, and in the area around Provost. These concentrations, along with the general sparseness of records in more northern parts of the study area suggest that most birds in the Parkland are now restricted to the southern fringe of the region. However, the observation of a pair of birds near Vermilion, which is possibly the most northerly record in Alberta during the last 15 years (Collister 1994), shows that shrikes still occur in more northern parts of the region. Furthermore, birds have been present at this same site for at least three of the last four years, and have raised young in at least two of these years (D. Moore, pers. comm.). Another recent record of a pair that successfully fledged a brood 15 km SE of Innisfail (approx. 52°00'N; 113°40'W) in 1999 (R. Bjorge, pers. comm.) indicates that loggerhead shrikes can also occur in low densities west of the boundaries of our study area. Additional searches will be required to determine the frequency of occurrence of birds in other areas of the Parkland, although densities will undoubtedly be much lower than we observed along the southern fringes of the region.

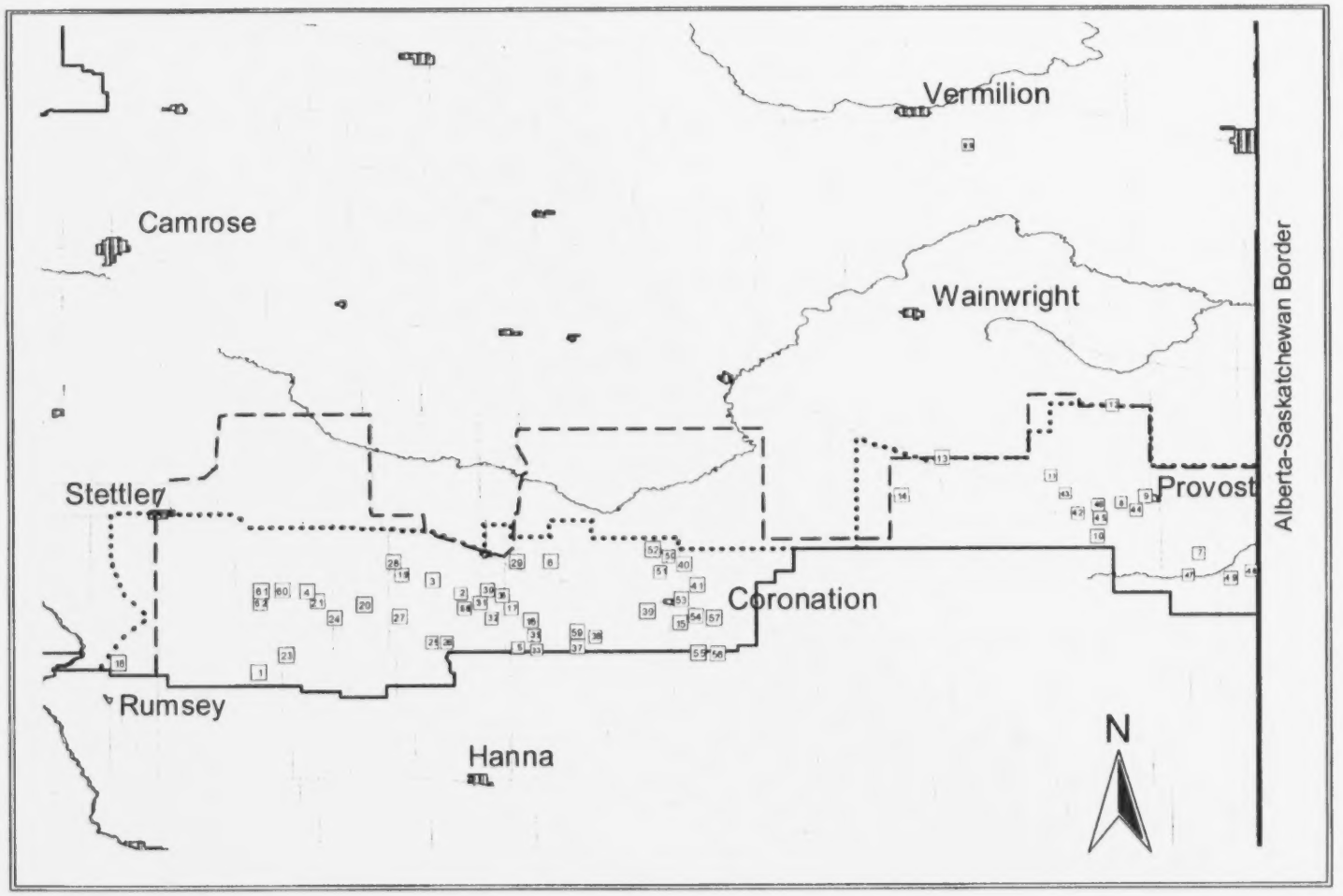

Figure 1. Locations where loggerhead shrikes were found in the Aspen Parkland Region in 2000 and 2001. The solid line represents the southern boundary of the Aspen Parkland. The dotted and dashed lines are the approximate extent of roadside surveys in 2000 and 2001, respectively. See Appendix 1 and 2 for information on specific points.

Overall numbers of shrikes, and the number of shrikes found per hour or kilometer surveyed, were all higher in 2001 than in 2000 (Table 1). However, it is unclear if these differences are related to real differences in population size, to variations in areas or time of year surveyed (surveys were conducted earlier in 2000), or to the survey technique used in each year. The similar number of shrikes found on routes surveyed in both years (0.024 sites/km in 2000 vs. 0.023 sites/km in 2001) casts doubt on the possibility of higher shrike populations in the area in 2001. Most likely, the higher number of shrikes is attributable to the more frequent use of call playbacks in 2001 (88% of sites vs. 29% in 2000). We made no attempt to quantify the responses of shrikes to playbacks, or to use playbacks in a structured fashion that would allow for a direct assessment of the effectiveness of this technique. However, it is clear that birds responded to the calls by moving towards the playback and/or vocalizing in response to the broadcast (H. Kiliaan, pers. obs), and that 48% more occupied sites were located per hour of field effort in the year when playbacks were used extensively (Table 1). The use of call playbacks should be further evaluated, but the technique appears to be a promising tool for surveying loggerhead shrikes.

There is no doubt that this preliminary census missed many of the shrikes that occupy the study area covered by this investigation. These numbers could be significantly higher as only 32.9 % of birds are detected (without playback) during roadside censuses in Alberta (Bjorge and Prescott 1996), and all work was conducted from the road in this study. Furthermore, no more than 50% of the roads in the study area were driven in each year, and low densities of shrikes occur north and west of the areas we searched. Regardless, it is doubtful than populations in the Aspen Parkland currently exceed 300-400 breeding pairs. Given that the species was formerly "a common summer resident" of the area (Farley 1932), and has experienced widespread population declines, continued monitoring of populations in this region is warranted.

5.0 RECOMMENDATIONS

The following recommendations are made in order to improve the effectiveness of the population estimates and trends of loggerhead shrikes in the Aspen Parkland Region of Alberta.

1. Conduct periodic monitoring of core areas on the southern edge of the Aspen Parkland (Gough Lake to Coronation, Provost area).

2. Continue searches for birds in other areas of the Parkland. Searches for new sites could be achieved by intensive searches, and by recruiting and informing members of the public and/or naturalists groups that sightings of loggerhead shrikes should be reported

3. Evaluate of the responses of loggerhead shrikes to call playback, and (if favourable), develop a protocol for use of playbacks during roadside surveys in the province.

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Appendix 1. Loggerhead shrikes found in the Central Aspen Parkland Region of Alberta in a 2000 survey. See Figure 1 for map of locations.

Site	Date	Habitat	# Shrikes	Latitude (°N)	Longitude (°W)
1	29 June	Powerline in cropland	1 adult	51°56'24"	112°28'59"
2	29 June	Dry slough in native pasture	1 adult	52°06'53.3"	111°57'26.3"
3	29 June	Willow patch in native pasture	2 adults	52°09'39.8"	112°01'33.7"
4	30 June	Pasture near farmyard	1 adult	52°06'25.2"	112°20'14"
5	04 July	Powerline near pasture	1 adult	51°58'07.6"	111°49'13.8"
6	04 July	Poplar/willow patch by dry slough surrounded by hay land	2 adults, 3 fledglings	52°12'24.8"	111°44'31"
7	05 July	Poplar patch/dry willow slough in cropland	2 adults,1 fledgling	52°12'41.6"	110°08'49.5"
8	05 July	Dry willow/poplar slough in cropland across from pasture	2 adults, 4 fledglings	52°20'19.2"	110°20'24.1"
9	05 July	Caragana/poplar shelterbelt at townedge	1 adult	52°21'13.8"	110°16'13.2"
10	05 July	Willow shrub in pasture	1 adult	52°15'34.5"	110°24'03"
11	05 July	Willow clump in pasture	2 adults, 4 nestlings	52°24'48.3"	110°30'28.4"
12	05 July	Nest in slough 200 m NW	1 adult, 3 fledglings	52°36'31.2"	110°21'17.2"
13	06 July	Willow patch in native pasture. Nest (contents unknown) under old magpie nest.	2 adults	52°27'46.4"	110°46'57.6"
14	06 July	Willow patch in native pasture (300 m E)	1 adult	52°22'10.3"	110°53'31.1"
15	07 July	Willow patch in native pasture	2 adults	52°02'54.8"	111°25'57.6"
16	07 July	Caragana/poplar shelterbelt beside pasture	2 adults	52°03'20.6"	111°47'43.9"
17	07 July	Poplar/willow line in hay pasture	1 adult	52°05'04.9"	111°51'33.3"
18	13 July	Dry willow slough in pasture	1 adult	51°57'04.8"	112°49'32.2"
99*	27 July	Not recorded	2 adults, 5 fledglings	53°16'15.6"	110°42'43.6"

* Incidental observation occurring outside the main study area near Vermilion.

Appendix 2. Loggerhead shrikes found in the Central Aspen Parkland Region of Alberta in the 2001 survey. See Figure 1 for map of locations.

Site	Date	Habitat	# Shrikes	Latitude (°N)	Longitude (°W)
1	20 June	Poplar patch	1 adult	51°56'40.1"	112°29'04.2"
2	28 June	Dry slough in native pasture	1 adult	52°06'53.3"	111°57'26.3"
3	20 June	Willow patch in native pasture	1 adult, 7 eggs	52°09'39.8"	112°01'33.7"
4	20 June	See site 22			
5	22 June	See site 34			
6	22 June	Poplar/willow patch in native pasture	2 adults, 6 nestlings	52°12'29.3"	110°44'31.1"
7	26 June	Willow patch in cropland	2 adults, 7 eggs	52°12'57.6"	110°08'48.8"
8	24 June	Brush pile in native pasture. Dry willow slough in fallow cropland	1 adult, 7 eggs	52°20'19.2"	110°'20'24.1"
9	24 June	Nest in dead spruce beside road. Caragana/poplar shelterbelt at town edge	2 adults	52°21'13.8"	110°16'13.2"
10	24 June	Willow shrub in pasture	None	52°15'34.5"	110°24' 01.3"
11	23 June	Willow patch in pasture	None	52°24'48.3"	110°30'28.4"
12	24 June	Slough	None	52°36'31.2"	110°21'17.2"
13	24 June	Willow patch in native pasture	None	52°27'46.4"	110°46'57.6"
14	23 June	Willow patch in native pasture	None	52°22'10.3"	110°53'31.1"
15	22 June	Willow patch in native pasture	1 adult, 3 nestlings	52°02'52.5"	111°25'57.4"
16	22 June	Caragana/poplar shelterbelt beside pasture	None	52°03'20.6"	111°47'43.9"
17	22 June	Poplar/willow line in hay pasture	None	52°05'20.2"	111°51'40.1"
18	20 June	Nest in willow in native pasture (50 m W)	1 adult, 5 nestlings	51°57'23.9"	112°49'20.5"
19	20 June	Dry willow slough in native pasture	1 adult, 6 nestlings	52°10'20.3"	112°07'31.0"
20	20 June	Native pasture	2 adults, 7 eggs	52°06'50.1"	112°12'20.3"
21	20 June	Dry willow slough in native pasture	2 adults, 7 eggs	50°06'50.4"	112°19'55.4"
22(4)*	20 June	Dry willow slough in native pasture	2 adults, 6 nestlings	52°07'00.5"	112°20'33.0"
23	20 June	Dry willow slough	2 adults, 5 nestlings	51°58'07.5"	112°24'53.4"
24	21 June	Dry willow slough in native pasture (50 m W)	1 adult	52°04'55.6"	112°17'22.6"
25	21 June	Willow in native pasture (300 m S)	1 adult	51°59'51.6"	112°02'44.2"
26	21 June	Willow/poplar patch in native pasture	1 adult, 6 eggs	51°59'50.9"	112°01'51.0"
27	21 June	Fence near dry willow slough in native pasture	1 adult	52°04'10.4"	112°07'22.7"
28	21 June	Willow patch in native pasture	2 adults, 6 nestlings	52°12'53.3"	112°08'47.6"
29	22 June	Willow line in native pasture and cropland	2 adults, 4 nestlings	52°12'37.6"	111°50'13.8"
30	22 June	Willow in road ditch. Pasture and cropland	2 adults, 5 nestlings	52°07'02.9"	111°55'56.7"
31	22 June	Willow line in native pasture, 150 m N	2 adults, 7 nestlings	52°06'49.3"	111°56'33.0"
32	22 June	Willow in road ditch. Native pasture, cropland, pasture	2 adults, 6 nestlings	52°04'13.6"	111°53'04.7"
33	22 June	Willow near pond. Native pasture and cropland	2 adults, 7 nestlings	51°59'51.0"	111°48'58.6"
34(5)*	22 June	Dry willow/poplar slough. Native	1 adult	51°58'20.7"	111°48'48.5"

		pasture			
35	22 June	Willow in native pasture	1 adult	52°00'08.6"	111°48'49.1"
36	23 June	Caragana/poplar patch in native pasture	1 adult, 6 nestlings	52°06'57.8"	111°53'04.7"
37	23 June	Willow line in native pasture	1 adult	51°59'59.3"	111°41'39.4"
38	23 June	Willow line in native pasture	2 adults, 6 nestlings	52°01'10.5"	111°38'47.8"
39	23 June	Willow line in native pasture across from cropland	1 adult, 6 eggs	52°05'17.3"	111°31'39.4"
40	23 June	Dry willow slough in native pasture	1 adult, 1 nestling, 1 egg	52°12'03.8"	111°25'46.7"
41	23 June	Caragana in shellterbelt. Cropland to north, native pasture to S	2 adults, 7 nestlings	52°09'36.8"	111°23'02.1"
42	24 June	Willows in sportsfield	1 adult	52°19'10.6"	110°27'10.3"
43	24 June	Maple line in native pasture	2 adults, 3 nestlings	52°22'33.6"	110°29'43.4"
44	25 June	Dry willow slough in cropland. Pasture 100 m to S	2 adults, 6 nestlings	52°20'57.6"	110°19'38.4"
45	25 June	Caragana shelterbelt in cropland. Cropland and native pasture to E	2 adults, 3 nestlings	52°19'35.3"	110°24'41.9"
46	25 June	Poplar in poplar/willow line, in native pasture	2 adults, 7 eggs	52°20'36.7"	110°24'42.5"
47	29 June	Maple beside house surrounded by cropland	2 adults, 4 nestlings	52°10'18.0"	110°10'06.2"
48	26 June	Dry willow slough in native pasture. Cropland to E	2 adults, 6 nestlings	52°10'49.7"	110°01'39.1"
49	26 June	Corral fence at south end of Bodo	1 adult	52°09'08.7"	110°04'44.5"
50	27 June	Maple in shelterbelt beside house. Native pasture	2 adults, 6 nestlings	52°12'05.1"	111°28'05.7"
51	27 June	Caragana in shelterbelt, 60 m W. Cropland	1 adults, 4 nestlings	52°11'51.8"	111°28'48.4"
52	27 June	Dry willow slough in native pasture	2 adults, 2 nestlings	52°14'33.6"	111°30'13.9"
53	27 June	Magpie nest in poplar of dry poplar/willow slough	2 adults, 4 nestlings	52°07'51.4"	111°25'56.8"
54	27 June	Willow in willow/poplar patch in native pasture and cropland	2 adults, 2 nestlings	52°04'17.5"	111°23'01.2"
55	27 June	Willow in dry slough in native pasture	2 adults, 6 nestlings	51°58'31.7"	111°23'05.3"
56	27 June	350 m NNE in willow patch in native pasture	1 adult, 6 eggs	51°58'32.7"	111°21'53.7"
57	27 June	Willow in native pasture	1 adult, 7 nestlings	52°04'25.2"	111°21'38.9"
58	28 June	Fence in native pasture	1 adult	52°05'21.0"	111°57'38.2"
59	28 June	Willow line in native pasture and dry slough	1 adult	52°01'11.6"	111°41'39.6"
60	30 June	Willow line in native pasture	2 adults, 3 nestlings	52°08'25.8"	112°25'54.9"
61	30 June	150 m S in willow in dry slough in cropland and native pasture	2 adults, 3 nestlings	52°08'33.4"	112°27'05.6"
62	30 June	Willow row in cropland and native pasture	1 adult	52°06'49.8"	112°28'22.8"

* Sites 22 and 34 were within 500 m of sites 4 and 5 respectively of the 2000 survey, and are therefore considered to be within the same territories as those sites.

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